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DWPI

DERWENT-ACC-NO: 1997-410958

DERWENT-WEEK: 199738

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TITLE: White gold@ alloy for spectacle frames - consisting of  
gold@, copper@,

silver@, palladium@ and e.g. zinc@, indium etc.

PATENT-ASSIGNEE: TANAKA KIKINZOKU KOGYO KK[TANI]

PRIORITY-DATA: 1996JP-0000665 (January 8, 1996)

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APPLICATION-DATA:

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INT-CL (IPC): C22C005/02

ABSTRACTED-PUB-NO: JP09184033A

BASIC-ABSTRACT: White gold alloy comprises (by wt.) 40-77% Au,  
10-20% Cu, 1-15%

Ag, and balance Pd, preferably 0.5-5% at least one of Zn, In, Sn,  
Rb, Ru, Ir,  
and Pt.

USE - For spectacles frames, accessories, and watch bands.

CHOSEN-DRAWING: Dwg.0/0

DERWENT-CLASS: M26

CPI-CODES: M26-B01; M26-B01C; M26-B01X;

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(71)Applicant : TANAKA KIKINZOKU KOGYO KK

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(72)Inventor : KASHIWAGI KOZO

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### (54) WHITE GOLD ALLOY

#### (57)Abstract:

PROBLEM TO BE SOLVED: To obtain a white gold alloy in which change of color into whitish yellow color is prevented and a pure white hue is provided, by specifying the composition of an alloy prepared by adding Cu to an Au-Pd alloy or Au-Pd-Ag alloy.

SOLUTION: This alloy has a composition consisting of, by weight, 40-77% Au, 10-20% Cu, 5-15% Ag, and the balance Pd. At this time, Ag in this alloy can be replaced by 0.5-5% of one or more elements among Zn, In, Sn, Rh, Ru, Ir, and Pt, or 0.5-5% of one or more elements among Zn, In, Sn, Rh, Ru, Ir, and Pt can be further added to the above alloy. Although Cu is added in order to provide age hardenability to this alloy, the additive quantity of Cu is limited to 10-20% in order to prevent the change of color into whitish yellow color resultant from Cu addition and also the additive quantity of Ag is limited to 5-15%. Moreover, Zn, In, Sn, Rh, Ru, Ir, and Pt are added for the purpose of actively producing a white hue and also surely providing age hardenability.

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(54) 【発明の名称】 ホワイト・ゴールド合金

(57) 【要約】

【課題】 眼鏡フレーム、装飾品（ブローチ、指輪、イヤリング）、時計バンド等の素材として、Ni、Crのアレルギー性皮膚炎を起こしやすい金属を含まず、鋳造性、加工性、時効硬化性の良い純白色系のホワイト・ゴールド合金を提供する。

【解決手段】 Au-Cu-Pd合金やAu-Cu-Pd-Ag合金に、Zn、In、Sn、Rh、Ru、Ir、Ptの少なくとも1種を0.5～5wt%添加してなるホワイト・ゴールド合金。

## 【特許請求の範囲】

【請求項1】 Au40～77wt%、Cu10～20wt%、Ag5～15wt%、残部Pdよりなるホワイト・ゴールド合金。

【請求項2】 Au40～77wt%、Cu10～20wt%、Zn、In、Sn、Rh、Ru、Ir、Ptの少なくとも1種を0.5～5wt%、残部Pdよりなるホワイト・ゴールド合金。

【請求項3】 Au40～77wt%、Cu10～20wt%、Ag5～15wt%、Zn、In、Sn、Rh、Ru、Ir、Ptの少なくとも1種を0.5～5wt%、残部Pdよりなるホワイト・ゴールド合金。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、眼鏡フレーム、装飾品（ブローチ、指輪、イヤリング）、時計バンド等の素材として用いるホワイト・ゴールド合金に関する。

## 【0002】

【従来の技術】従来、上記の素材としては、白色で加工性の良いAu-Pd合金、Au-Pd-Ag合金が主として用いられてきたが、時効硬化性がないため、ろう付等の熱処理をすると軟化してしまう。また、Au-Pd合金は白色系であるが、白灰色であり、良い色相ではない。このため、Au-Pd合金、Au-Pd-Ag合金にNiを添加することが行われている。Niの添加量を多くする程Au-Pd合金、Au-Pd-Ag合金は白色になり、且つ硬くなるが、添加量が多すぎると硬くなり過ぎて加工性が低下するので、実用できる添加量は5～15wt%とされている。

【0003】ところで、Ni、Crのアレルギー性皮膚炎を起こしやすい金属を含有するAu-Pd合金、Au-Pd-Ag合金と接触すると、アレルギーが生じる人がいるので、上記のNi添加のAu-Pd合金、Au-Pd-Ag合金は眼鏡フレーム、装飾品（ブローチ、指輪、イヤリング）、時計バンド等の素材としては不向きである。

【0004】一方、Au-Pd合金、Au-Pd-Ag合金にCuを添加して時効硬化を図ることができるが、白黄色となり、上記の素材としては使用できない。

## 【0005】

【発明が解決しようとする課題】そこで本発明は、Ni、Crのアレルギー性皮膚炎を起こしやすい金属を含まず、 casting性、加工性、時効硬化性の良い純白色系のホワイト・ゴールド合金を提供しようとするものである。

## 【0006】

【課題を解決するための手段】上記課題を解決するための本発明のホワイト・ゴールド合金の1つは、Au40～77wt%、Cu10～20wt%、Ag5～15wt%、残部Pdよりなるものである。

りなるものである。

【0007】本発明のホワイト・ゴールド合金の他の1つは、Au40～77wt%、Cu10～20wt%、Zn、In、Sn、Rh、Ru、Ir、Ptの少なくとも1種を0.5～5wt%、残部Pdよりなるものである。

【0008】本発明のホワイト・ゴールド合金のさらに他の1つは、Au40～77wt%、Cu10～20wt%、Ag5～15wt%、Zn、In、Sn、Rh、Ru、Ir、Ptの少なくとも1種を0.5～5wt%、残部Pdよりなるものである。

【0009】上記本発明のホワイト・ゴールド合金の1つは、従来のAu-Pd-Ag合金に時効硬化性を付与するためにCuを添加したものであるが、Cuの添加により白黄色となるのを防ぐために、Cuの添加量を10～20wt%と規定し、Agの添加量を5～15wt%と規定したもので、この範囲内では純白色の色相を呈し、硬さも満足できるものである。

【0010】また、上記本発明のホワイト・ゴールド合金の他の1つは、従来のAu-Pd合金に時効硬化性を付与するためにCuを添加したものであるが、Cuの添加により白黄色となるのを防ぐと共に積極的に白色の色相を呈するようにし、且つ時効硬化性を確実に付与するために、Zn、In、Sn、Rh、Ru、Ir、Ptを添加したもので、これらの少なくとも1種の添加量が0.5～5wt%の範囲内では硬さが適切で良好な純白色の色相を呈する。

【0011】また、本発明のホワイト・ゴールド合金のさらに他の1つは、従来のAu-Pd-Ag合金に時効硬化性を付与するためにCuを添加すると共に、Cuの添加により白黄色となるのを防ぐと共に積極的に純白色の色相を呈するようにし、且つ時効硬化性を確実に付与するために、Zn、In、Sn、Rh、Ru、Ir、Ptを添加したもので、これらの少なくとも1種の添加量が0.5～5wt%の範囲内では硬さが硬くなり過ぎることがなくて加工性が良く、純白色の色相を呈する。とくにZn、In、Snは、純白色の色相を得るのに極めて効果的であり、且つ casting時の流れが良くなる。しかもZnは脱酸硬化があるので、溶解が良好に行われ、加工後硬さが増すので、傷が付きにくくなる。

## 40 【0012】

【実施例】本発明のホワイト・ゴールド合金の実施例を従来例と共に説明する。下記の表1の左欄に示す実施例1～6の成分組成のホワイト・ゴールド合金と従来例1～4の成分組成のホワイト・ゴールド合金を溶解 castingし、色相、 casting時の硬さ、時効硬化の硬さ、 casting性を調べた。表1の右欄に示すような結果を得た。

## 【0013】

## 【表1】

3		4			
	成分組成 (wt%)	色相	磨削時の硬さ	時効硬化の硬さ	鍛造性
実施例1	Au58.3Cu16.7Pd15Ag10	純白色	195Hv	270Hv	○
実施例2	Au58.3Cu19.7Pd20Zn2	純白色	240Hv	370Hv	○
実施例3	Au50Cu20Pd23Ag6Sn1	純白色	190Hv	250Hv	○
実施例4	Au75Pd10Cu7Ag6In2	純白色	180Hv	230Hv	○
実施例5	Au58.3Cu19.7Ag10Pd10Ru1Rh1	純白色	200Hv	290Hv	○
実施例6	Au58.3Cu15Ag12Pd11.7Pt2Ir1	純白色	210Hv	320Hv	○
従来例1	Au75Pd25	白灰色	170Hv	170Hv	○
従来例2	Au75Pd10Ni15	灰色	140Hv	140Hv	○
従来例3	Au50Pd20Cu30	白黄色	250Hv	350Hv	○
従来例4	Au65Ni13.5Cu18.5Zn3	灰色	160Hv	280Hv	○

【0014】上記の表1の右欄に示す結果で明らかなように従来例1、2のホワイト・ゴールド合金は時効硬化性が無い為、ろう付等の熱処理をすると軟化し、しかも従来例1のホワイト・ゴールド合金は色相は白灰色であり、また従来例3のホワイト・ゴールド合金は時効硬化性があるが、色相は白黄色であり、さらに従来例4のホワイト・ゴールド合金は時効硬化性があり、色相が白色で良いが、アレルギー性皮膚炎を起こしやすい金属であるNiを含有している。従って、これら従来例1～4のホワイト・ゴールド合金は、眼鏡フレーム、装飾品（ブローチ、指輪、イヤリング）、時計バンド等の素材としては不適である。然るに実施例1～6のホワイト・ゴールド合金は、全て時効硬化性があり、色相は純白色でし\*30

\* かもアレルギー性皮膚炎を起こしやすい金属であるNi、Crを含有していないので、眼鏡フレーム、装飾品（ブローチ、指輪、イヤリング）、時計バンド等の素材として好適であることが判る。

【0015】

【発明の効果】以上の説明で判るように本発明のホワイト・ゴールド合金は、色相が純白色であり、また鍛造性、加工性も良く、特に時効硬化性を有するので、ろう付等の熱処理をしても軟化することがなく、逆に硬くなり、ばね性、耐摩耗性も向上する。従って、眼鏡フレーム、装飾品（ブローチ、指輪、イヤリング）、時計バンド等の素材として極めて有用である。

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CLAIMS

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[Claim(s)]

[Claim 1] The white GORURUDO alloy which consists of the remainder Pd Ag5 - 15wt% Cu10 - 20wt% Au40 - 77wt%.

[Claim 2] At least one sort of Au40 - 77wt%, Cu10 - 20wt%, and Zn, In, Sn, Rh, Ru, Ir and Pt White gold alloy which consists of the remainder Pd 0.5 - 5wt%.

[Claim 3] At least one sort of Au40 - 77wt%, Cu10 - 20wt%, Ag5 - 15wt%, and Zn, In, Sn, Rh, Ru, Ir and Pt White gold alloy which consists of the remainder Pd 0.5 - 5wt%.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the white gold alloy used as materials, such as a glasses frame, accessories (a broach, a ring, earring), and a watchband.

[0002]

[Description of the Prior Art] Although it is white and the good Au-Pd alloy of processability and the Au-Pd-Ag alloy have mainly been conventionally used as the above-mentioned material, in order that there may be no age-hardening nature, it will soften, if brazing etc. is heat-treated. Moreover, although a Au-Pd alloy is a white system, it is white gray and is not a good hue. For this reason, adding nickel into a Au-Pd alloy and an Au-Pd-Ag alloy is performed. Although a Au-Pd alloy and an Au-Pd-Ag alloy become white and it becomes hard so that the addition of nickel is made [ many ], since it will become hard too much and processability will fall if there are too many additions, the usable addition is made into 5 - 15wt%.

[0003] By the way, since there are those whom allergy produces when the Au-Pd alloy and Au-Pd-Ag alloy containing nickel and the metal which is easy to start the allergic dermatitis of Cr are contacted, the Au-Pd alloy of the above-mentioned nickel addition and the Au-Pd-Ag alloy are unsuitable as materials, such as a glasses frame, accessories (a broach, a ring, earring), and a watchband.

[0004] On the other hand, although Cu can be added into a Au-Pd alloy and an Au-Pd-Ag alloy and an age-hardening can be attained, it becomes white yellow and cannot be used as the above-mentioned material.

[0005]

[Problem(s) to be Solved by the Invention] Then, this invention tends to offer the white gold alloy of the good snow-white color system of fluidity, processability, and age-hardening nature excluding nickel and the metal which is easy to start the allergic dermatitis of Cr.

[0006]

[Means for Solving the Problem] One of the white gold alloys of this invention for solving the above-mentioned technical problem consists of the remainder Pd Ag5 - 15wt% Cu10 - 20wt% Au40 - 77wt%.

[0007] Other one of the white gold alloys of this invention is at least one sort of Au40 - 77wt%, Cu10 - 20wt%, and Zn, In, Sn, Rh, Ru, Ir and Pt. It consists of the remainder Pd 0.5 - 5wt%.

[0008] One of the white gold alloys of this invention of further others is at least one sort of Au40 - 77wt%, Cu10 - 20wt%, Ag5 - 15wt%, and Zn, In, Sn, Rh, Ru, Ir and Pt. It consists of the remainder Pd 0.5 - 5wt%.

[0009] In order to prevent becoming white yellow by addition of Cu although one of the white gold alloys of the above-mentioned this invention adds Cu in order to give age-hardening nature to the conventional Au-Pd-Ag alloy, it is what specified the addition of Cu as 10 - 20wt%, and specified the addition of Ag as 5 - 15wt%, and the hue of a snow-white color is presented and hardness can also be satisfied within the limits of this.

[0010] Moreover, although Cu is added in order for other one of the white gold alloys of the above-mentioned this invention to give age-hardening nature to the conventional Au-Pd alloy While preventing becoming white yellow by addition of Cu, in order to present a white hue positively and to give age-hardening nature certainly It is what added Zn, In, Sn, Rh, Ru, Ir, and Pt, and at least one sort of these additions In within the limits which is 0.5 - 5wt%, hardness presents the hue of a suitable and good snow-white color.

[0011] One [ moreover, ] of the white gold alloys of this invention of further others In order to give age-hardening nature to the conventional Au-Pd-Ag alloy, while adding Cu While preventing becoming white yellow by addition of Cu, in order to present the hue of a snow-white color positively and to give age-hardening nature certainly It is what added Zn, In, Sn, Rh, Ru, Ir, and Pt, and at least one sort of these additions In within the limits which is 0.5 - 5wt%, hardness does not become hard too much, and processability is good and presents the hue of a snow-white color. Especially Zn, In, and Sn are very effective for acquiring the hue of a snow-white color, and the place flow at the time of casting becomes good. And since Zn has deoxidation hardening, the dissolution is performed good, and since the hardness after processing increases, a blemish stops being attached easily.

[0012]

[Example] The example of the white gold alloy of this invention is explained with the conventional example. Dissolution casting of the white gold alloy of component composition of an example 1-6 and the white gold alloy of component



composition of the conventional example 1-4 which are shown in \*\*\*\* of the following table 1 was carried out, and the result as shown in \*\*\*\* of a place and Table 1 which investigated a hue, the hardness at the time of casting, the hardness of an age-hardening, and fluidity was obtained.

[0013]

[Table 1]

	成分組成 (wt%)	色相	鋳造時の硬さ	焼入れ硬化の硬さ	鋳造性
実施例1	Au58.3Cu16.7Pd15Ag10	純白色	195Hv	270Hv	○
実施例2	Au58.3Cu19.7Pd20Zn2	純白色	240Hv	370Hv	○
実施例3	Au50Cu20Pd23Ag6Sn1	純白色	190Hv	250Hv	○
実施例4	Au75Pd10Cu7Ag6In2	純白色	180Hv	230Hv	○
実施例5	Au58.3Cu19.7Ag10Pd10Ru1Rh1	純白色	200Hv	290Hv	○
実施例6	Au58.3Cu15Ag12Pd11.7Pt2Ir1	純白色	210Hv	320Hv	○
従来例1	Au75Pd25	白灰色	170Hv	170Hv	○
従来例2	Au75Pd10Ni15	白色	140Hv	140Hv	○
従来例3	Au50Pd20Cu30	白黄色	250Hv	350Hv	○
従来例4	Au65Ni13.5Cu18.5Zn3	白色	160Hv	280Hv	○

[0014] In order that the white gold alloy of the conventional examples 1 and 2 may not have age-hardening nature so that clearly [ in the result shown in \*\*\*\* of the above-mentioned table 1 ], it is heat treatment of brazing etc. Then, although it softens, and the hue of the white gold alloy of the conventional example 1 is moreover white gray and the white gold alloy of the conventional example 3 has age-hardening nature, a hue is white yellow, the white gold alloy of the conventional example 4 has age-hardening nature further, and although a hue may be white, nickel which is the metal which is easy to start allergic dermatitis is contained. Therefore, the white gold alloy of these conventional examples 1-4 is unsuitable as materials, such as a glasses frame, accessories (a broach, a ring, earring), and a watchband. It is alike and all of the white gold alloy of examples 1-6 have age-hardening nature, and since nickel and Cr which are the appropriate metal which is moreover easy to start allergic dermatitis in a snow-white color are not contained, as for a hue, it turns out that it is suitable as materials, such as a glasses frame, accessories (a broach, a ring, earring), and a watchband

[0015]

[Effect of the Invention] A hue is a snow-white color, and the white gold alloy of this invention of fluidity and processability is also good, since it has especially age-hardening nature, it does not soften, even if it heat-treats brazing etc., and it becomes hard conversely, and spring nature and its abrasion resistance also improve, so that it may understand by the above explanation. Therefore, it is very useful as materials, such as a glasses frame, accessories (a broach, a ring, earring), and a watchband.

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[Translation done.]